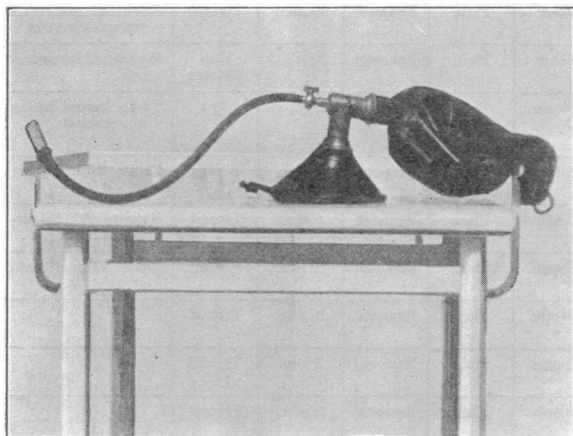


PRELIMINARY REPORT ON ETHYL CHLORIDE ANESTHESIA IN MINOR OPERATIONS *

By LOUISE A. OLDENBOURG, M. D., Berkeley

Ethyl chloride (aethylis chloridum) is a colorless, extremely volatile liquid, with aromatic odor and sweetish taste. It boils at 12.5 C. (55 degrees F.), and so must be kept in sealed containers. The anesthetizing power of ethyl chloride was reported by Flourens in 1841, and the drug was first administered as a general anesthetic by Heyfelder in 1848. As an anesthetic it may be administered by either the open or the closed method.

The cases here reported were anesthetized by the closed method, with Daniell's mask. They comprise observations in operations of less than ten minutes' duration. When this method is employed after three or four respirations, the breathing becomes deeper and more rapid, remaining regular, deepening to a slight stertor, face flushes to a healthy red, slight perspiration may appear on the face and neck, eyeballs move from side to side,



The Daniell's Mask Used in the Administration of the Ethyl Chloride Anesthetics.

becoming fixed in a convergent squint, usually downward. Pupils are dilated and the corneal reflex is lost. The pulse is full, regular, and slow. To avoid crowding or a sudden concentrated flow of vapor, the tube containing the ethyl chloride was gradually immersed in hot water. Observations were based upon eighty-five cases of tonsillectomy and adenectomy (by the Sluder method) in patients from two to fifteen years of age, and twenty teeth extractions (some requiring gouging of roots) in patients from six to fifty-six years of age. The time of induction of anesthesia was from 30 to 60 seconds and the time from the beginning of anesthesia, completion of the operation for removal of tonsils and adenoids to the return of consciousness was from four to five minutes. The average anesthesia was smooth, without a stage of excitement or agitation, and with complete muscular relaxation. Upon recovery, in

several patients, there was stiffening of the extremities and delirium, some vomiting, but no masseter spasm nor respiratory paralysis. The closest approach to this type occurred in a girl nine years of age, taking 3 cc., who held her breath for a few seconds, had twitching of eyelids, and stiffening of the extremities; but she had a quiet recovery without nausea or vomiting. A very nervous woman (forty-five years) anesthetized for the removal of a vaginal pessary, and who took 4 cc. of ethyl chloride, had clonic contractions of the extremities, with very *slow*, full pulse and retarded but satisfactory recovery. A three-year-old boy came to the operating-table with a nickle in his hand. Upon awakening, still on the operating-table, and being shown the coin, he recognized and reached for it. Children of two to three and four years of age were carried to the recovery room, the rest walked to their beds. If the throat required inspection after the operation, the little patients always responded to orders and opened their mouths. A stage of analgesia continues for some time afterwards, permitting further manipulations if necessary.

To procure success in the administration of ethyl chloride the drug must be chemically pure, the dose must be properly regulated to suit each individual case, and care must be exercised owing to the rapid transit of the drug from the second, to the third and fourth stages. Rather than to increase the amount of 5 cc. of ethyl chloride for an adult, it is advisable to add 1 cc. of ether, thereby prolonging the anesthesia without increasing the dangers. However, the dose should not be a hard-and-fast rule. The weight, height, build, and general appearance and condition of the individual should be considered and be the guiding factors. Recently, as you all know, the safety of ether and particularly chloroform, has been increased by the addition of oxygen. Gwathmey and Rice are advocates of this addition to ethyl chloride. The description of ethyl chloride anesthesia of Hewitt more or less coincides with the later work of Guedel which condition he designates *spasm type* and the *depression type*. Contrary to Hewitt, however, who states that ethyl chloride produces a fall in blood pressure and a slow pulse, Guedel claims a loss in systolic blood pressure of only 4 mm. and a loss in diastolic of 7 mm. and an *increase* in pulse rate of eleven beats per minute.

The advantages of this anesthetic are the following:

1. A quick narcosis from which the patient recovers promptly.
2. Ethyl chloride has a pleasant odor and is not irritating to the respiratory mucous membrane.
3. Stage of excitement, if any, is very short.
4. No increase in saliva and bronchial secretions, no cyanosis or venous congestion.
5. The small amount of the drug necessary.

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6. Readily administered in emergency surgery on account of its portability and where nitrous oxide oxygen apparatus is not available.
7. Vomiting occurs in only a small percentage of cases after anesthesia, and when it does occur, is not prolonged or distressing.
8. It is particularly adaptable to children.
9. May be used for induction to other anesthetics.
10. In simple overdose, resuscitation by the usual methods is quickly accomplished owing to the extreme volatility of the drug and its rapid elimination.

The danger signals of ethyl chloride anesthesia appear without warning on account of its quickness in effect and rapid transit into its different stages.

Contra-indications, as follows:

1. It is not suitable for prolonged administration on account of its dangers, expense, and great strain on the anesthetist.
2. It should not be used in alcoholists and neurotics, and is decidedly contra-indicated in mechanical and inflammatory respiratory obstruction; in cardio-vascular degenerations and all conditions giving rise to marked dyspnoea.

Although in 1880 the British Medical Association condemned the use of ethyl chloride as being too dangerous, its use now in England and Scotland is prevalent. In a report of anesthetics given in the Ear, Nose and Throat Department of the Royal Infirmary of Edinburgh, Scotland, for the year 1920, there were over 1200 ethyl chloride anesthetics. This represents double the number of any other anesthetic given in this department. Enthusiastic advocates of this anesthetic are M. W. Ware of New York, A. H. Miller of Rhode Island, Erdman of Brooklyn. Murray, in 1905, reported 150 administrations in infants one year of age; the youngest patients were five to fourteen days old; the larger proportion were from five to seven weeks old. A. H. Miller of Providence, Rhode Island, in 1912, compiled the experiences of twelve anesthetists; in this series there occurred one death in every 13,365 administrations. M. W. Ware of New York, in 1917, reported one death in every 15,000 ethyl chloride anesthetics. In January, 1922, Webster of Winnipeg, Canada, reported 22,000 administrations without a fatality, although the greater number of these were inductions to ether. However, he considers nitrous oxide safer. He uses the closed method, using the Ormsby inhaler and prefers it to the open method. Guedel of Indianapolis uses the Yankauer mask, and places ethyl chloride third in value to nitrous oxide and oxygen and ether, and above chloroform. He reports two thousand cases without a death, fifteen of which were for prolonged anesthesia of fifty-three minutes duration.

(I am greatly indebted to Dr. May Walker of Oakland for her guidance and instructions in my first administrations of ethyl chloride as a general anesthetic in minor surgery.)

INDICATIONS FOR THE ADMINISTRATION OF QUINIDIN IN AURICULAR FIBRILLATION *

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In 1918, W. Frey announced that a certain proportion of patients suffering from auricular fibrillation regained a regular heart rhythm after having been treated with quinidin sulphate. This announcement was followed by confirmatory reports from many sources. A review of these reports indicates that certain facts concerning the action of quinidin now seem established. In some patients with auricular fibrillation the drug is clearly indicated, in others its use is not so promising, and in still others it occasionally does positive harm.

The main facts upon which the indications for quinidin rest are as follows:

1. A normal rhythm has been restored in over 50 per cent of the reported cases of auricular fibrillation that have been treated with quinidin.

2. The results obtained have been markedly influenced by the duration of the fibrillation. Where the irregularity had been of very recent onset, the drug usually succeeded; where the irregularity had lasted more than a year, successes were much less common. Of nineteen chronic cases reported by Frey, five became regular. My own experience has been much less favorable; for I have had only two successes where the abnormal rhythm had presumably lasted continuously for a year or more (see Chart 1).

3. Other factors, which apparently influenced the results of quinidin treatment, were cardiac decompensation, cardiac dilatation, and the dose of the drug employed. Cardiac decompensation and cardiac dilatation are said to lessen the chances for recovery of the normal rhythm. Where the normal rhythm has been restored, this has usually occurred with moderate doses of the drug given for two to four days; but in some patients the normal rhythm has become established only after large doses have been given or the treatment has been continued for a week or more. Thus, the percentage of restorations has been somewhat higher when large doses have been given to stubborn cases for a week or more. Neither the patient's age, nor his blood pressure, nor the presence or absence of chronic endocarditis has appeared to influence the results obtained.

4. In the vast majority of patients whose normal rhythms have been restored, the fibrillation has recurred; frequently within a few days, in other cases only after months. Except in paroxysmal types of fibrillation, the persistence of a normal rhythm for nine months or over has been exceptional. Recurrences have frequently been controlled by repeating the treatment; but in some cases the drug, though at first successful, has failed on the second or third recurrence. An important question, not yet decided, is whether such patients should receive the drug continuously with the hope of averting fresh attacks of fibrillation.

5. In most patients, the drug has produced no

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